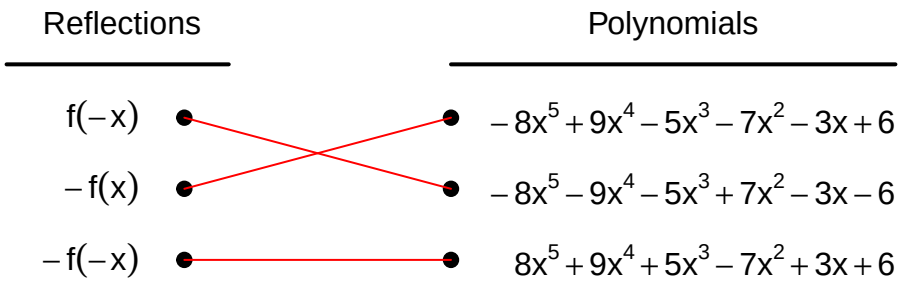
Name: Date:

Exam: Function Reflections (Solution version 625)

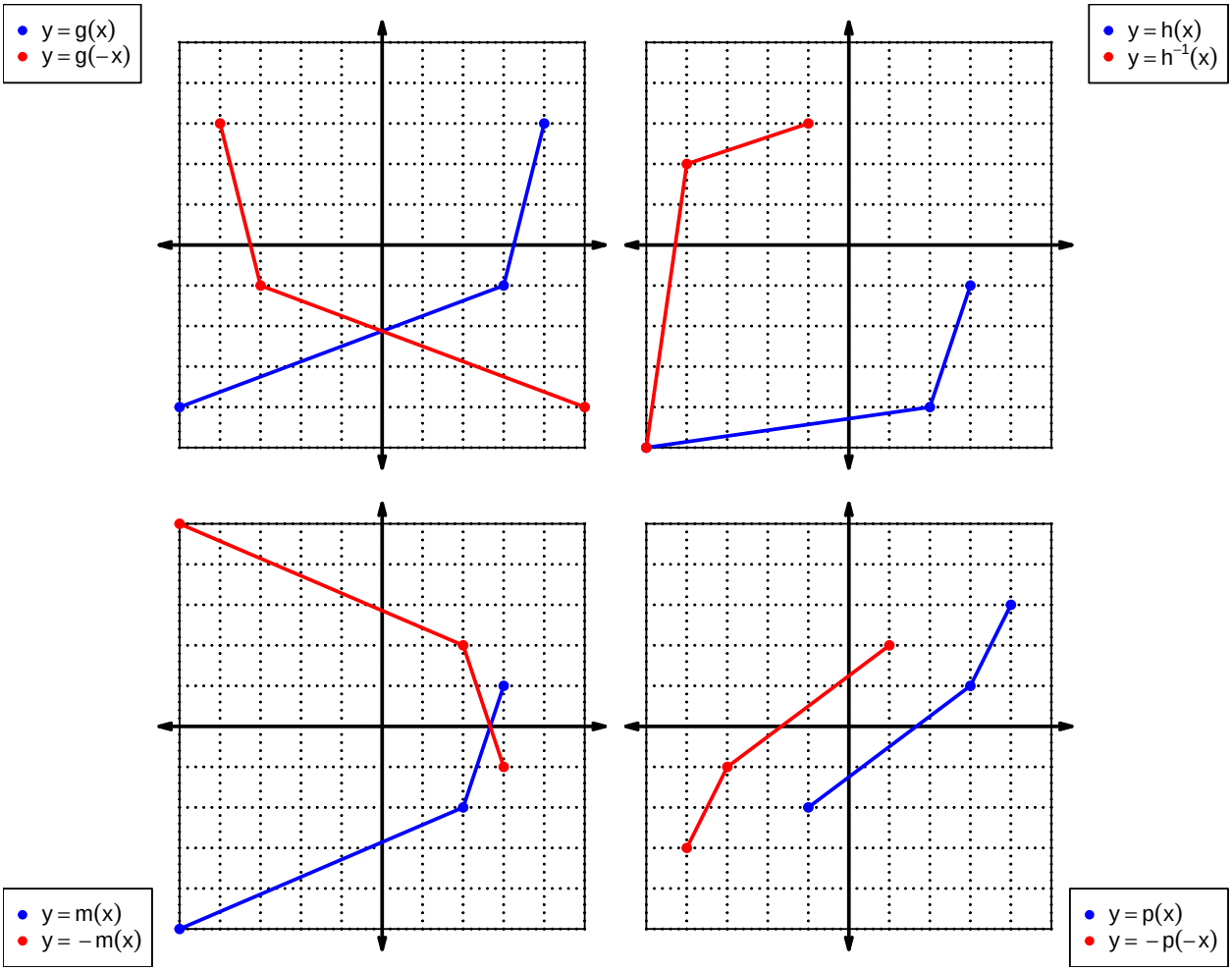
1. (worth 9 points) Let function f be defined by the polynomial below:

$$f(x) = 8x^5 - 9x^4 + 5x^3 + 7x^2 + 3x - 6$$

Draw lines that match each function reflection with its polynomial:



2. (worth 20 points) In each xy plane shown below, a function is graphed with blue. Draw the indicated reflections (as a second curve, indicated in legend) with black (or with whatever you have). The x axis is horizontal and the y axis is vertical (as typical), and the scale is equal on both axes.



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For all questions on this page, the functions f, g, and h are defined by the table below.

x	$f(x)$	$g(x)$	$h(x)$
1	8	2	4
2	3	1	9
3	7	8	2
4	6	5	3
5	2	6	1
6	1	7	8
7	4	9	7
8	9	4	5
9	5	3	6

3. (worth 3 points) Evaluate $g(6)$.

$$g(6) = 7$$

4. (worth 3 points) Evaluate $h^{-1}(2)$.

$$h^{-1}(2) = 3$$

5. (worth 3 points) Assuming f is an **odd** function, evaluate $f(-1)$.

If function f is odd, then

$$f(-1) = -8$$

6. (worth 3 points) Assuming g is an **even** function, evaluate $g(-9)$.

If function g is even, then

$$g(-9) = 3$$

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7. (worth 15 points) A function, f, is **even** if $f(x) = f(-x)$ for all x in the domain. A function, g, is **odd** if $g(x) = -g(-x)$ for all x in the domain.
Let polynomial p be defined with the following equation:

$$p(x) = -x^2 - 1$$

a. Express $p(-x)$ as a polynomial in standard form.

$$p(-x) = -(-x)^2 - 1$$
$$p(-x) = -x^2 - 1$$

b. Express $-p(-x)$ as a polynomial in standard form.

$$-p(-x) = -\left(-x^2 - 1\right)$$
$$-p(-x) = x^2 + 1$$

c. Is polynomial p even, odd, or neither?

even

d. Explain how you know the answer to part c.

We see that $p(x) = p(-x)$ for all x because $p(x)$ and $p(-x)$ are equivalent polynomials. Thus function p satisfies the criterion for being an even function.

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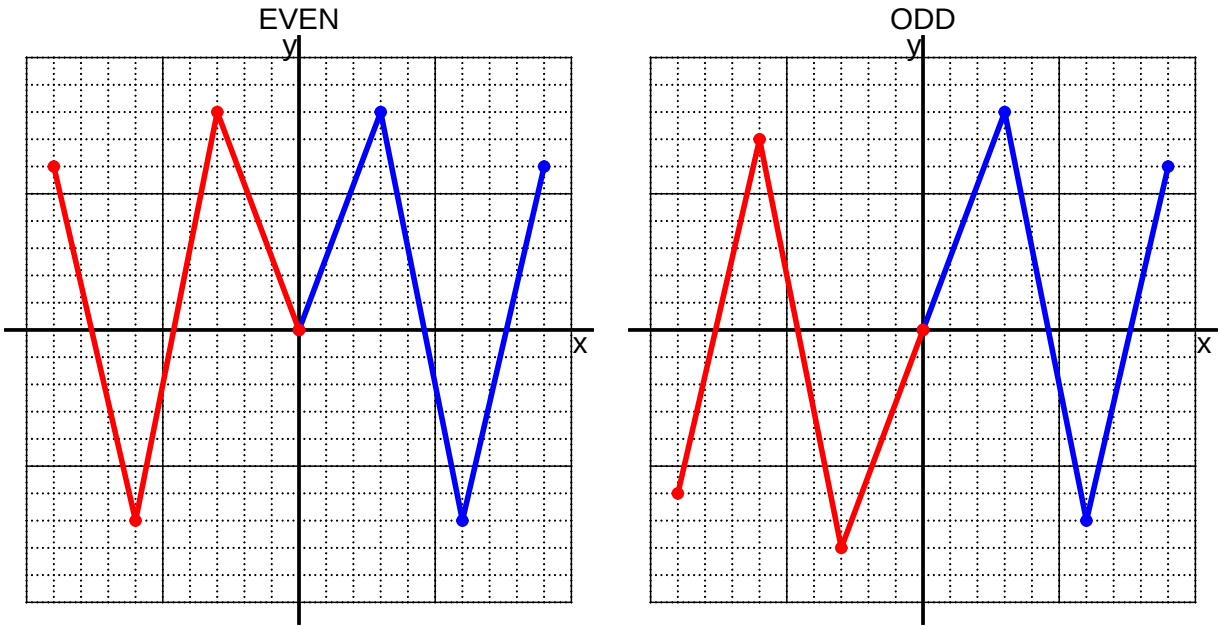
8. (worth 10 points) I have drawn half of a function. Draw the other half to make it even or odd.



9. (worth 10 points) Let function f be defined with the equation below.

$$f(x) = 9x + 6$$

a. Evaluate $f(10)$.

step 1: multiply by 9
step 2: add 6

$$f(10) = 9(10) + 6$$
$$f(10) = 96$$

b. Evaluate $f^{-1}(24)$.

step 1: subtract 6
step 2: divide by 9

$$f^{-1}(x) = \frac{x - 6}{9}$$
$$f^{-1}(24) = \frac{(24) - 6}{9}$$
$$f^{-1}(24) = 2$$

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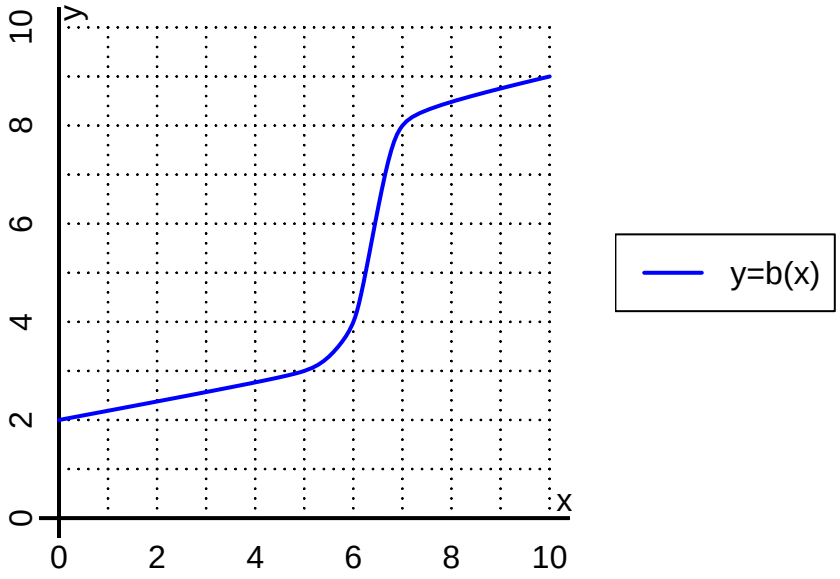
10. (worth 6 points) The function b is represented by the curve $y = b(x)$ graphed below.



a. Evaluate $b(5)$.

$b(5) = 3$

b. Evaluate $b^{-1}(4)$.

$b^{-1}(4) = 6$

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11. (worth 18 points) Function f is defined by the table below.

    a. Complete the columns for $-f(x)$ and $f(-x)$ and $-f(-x)$.

x	$f(x)$	$-f(x)$	$f(-x)$	$-f(-x)$
-2	-9	9	-9	9
-1	-6	6	6	-6
0	0	0	0	0
1	6	-6	-6	6
2	-9	9	-9	9

b. Is function f even, odd, or neither?

neither

c. How do you know the answer to part b?

Function f is neither because neither column $-f(-x)$ nor column $f(-x)$ matches column $f(x)$ exactly.